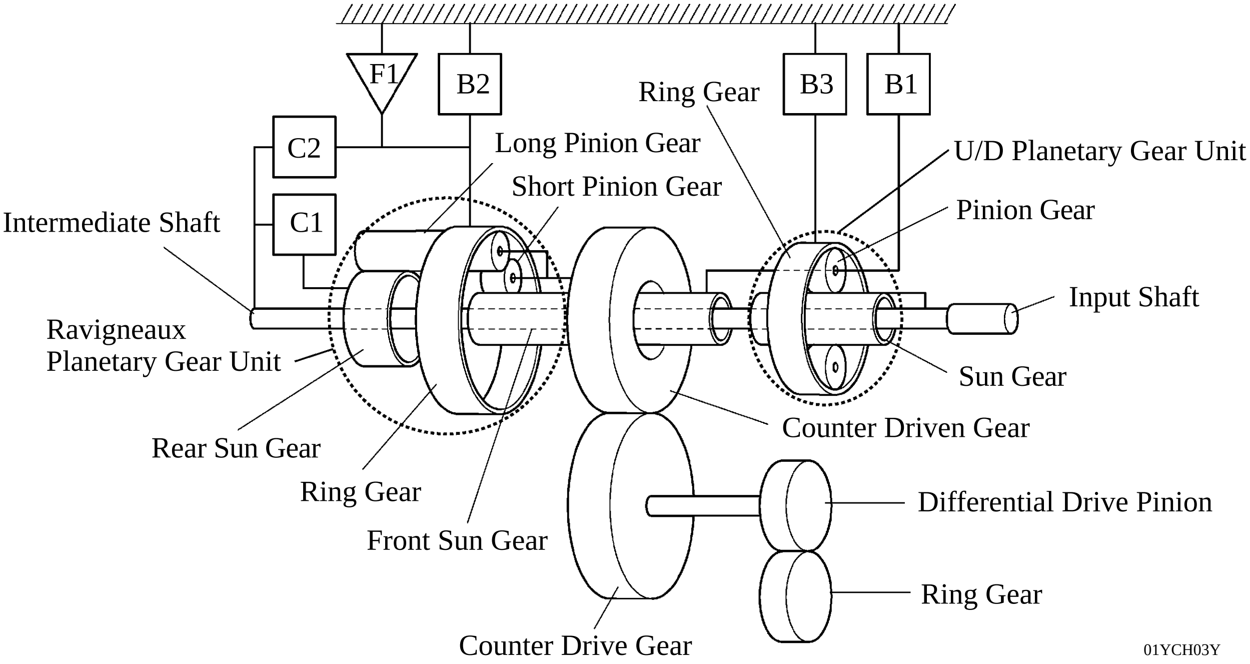
■PLANETARY GEAR UNIT

1. Construction

- The 6-speed configuration has been achieved by using 2 planetary gear units, creating a 6-speed automatic transaxle.
- A Ravingneaux type planetary gear unit is used as the rear gear unit. The gear unit consists of pairs of sun gears (front and rear) and planetary pinion gears (long and short) with different diameters within a single planetary gear.
- The centrifugal fluid pressure canceling mechanism is used in the C1 and C2 clutches that are applied when shifting between the 1st to 6th gears. Refer to CH-16 for details.
- The shapes of the grooves in the clutches and brake linings have been optimized in order to reduce drag during clutch and brake operation.



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2. Function of Components

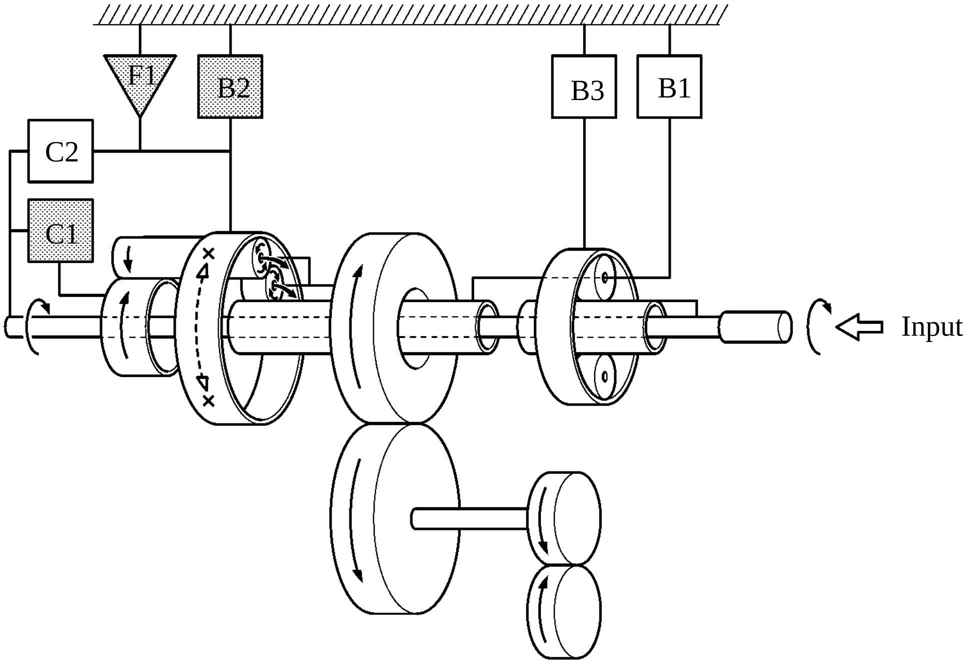
Component		Function
C1	No.1 Clutch	Connects intermediate shaft and Ravigneaux planetary rear sun gear.
C2	No.2 Clutch	Connects intermediate shaft and Ravigneaux planetary ring gear.
B1	No.1 Brake	Prevents Ravigneaux planetary front sun gear and U/D planetary carrier from turning either clockwise or counterclockwise.
B2	No.2 Brake	Prevents Ravigneaux planetary ring gear from turning either clockwise or counterclockwise.
B3	No.3 Brake	Prevents U/D planetary ring gear from turning either clockwise or counterclockwise.
F1	No.1 One-Way Clutch	Prevents Ravigneaux planetary ring gear from turning counterclockwise.
Planetary Gears		These gears change the route through which driving force is transmitted, in accordance with the operation of each clutch and brake, in order to increase or reduce the input and output speeds.

3. Transaxle Power Flow

Shift Lever Position	Gear	Solenoid Valve						Clutch		Brake			One-way Clutch
		SL	SL1	SL2	SL3	SL4	SLU	C1	C2	B1	B2	B3	F1
P	Park		○										
R	Reverse	●				○					○	○	
N	Neutral		○										
D, S6	1st		○					○					○
	2nd	○	○		○		Δ	○		○			
	3rd	○	○			○	Δ	○				○	
	4th	○	○	○			Δ	○	○				
	5th	○		○		○	Δ		○			○	
	6th	○		○	○		Δ		○	○			
S5	1st		○					○					○
	2nd	○	○		○		Δ	○		○			
	3rd	○	○			○	Δ	○				○	
	4th	○	○	○			Δ	○	○				
	5th	○		○		○	Δ		○			○	
S4	1st		○					○					○
	2nd	○	○		○		Δ	○		○			
	3rd	○	○			○	Δ	○				○	
	4th	○	○	○			Δ	○	○				
S3	1st		○					○					○
	2nd		○		○			○		○			
	3rd		○			○		○				○	
S2	1st		○					○					○
	2nd		○		○			○		○			
S1	1st		○				○	○			○		○

○: ON Δ: In accordance with flex lock-up ●: ON while engaging, OFF after engaged

1st Gear (S Mode 1 Range)



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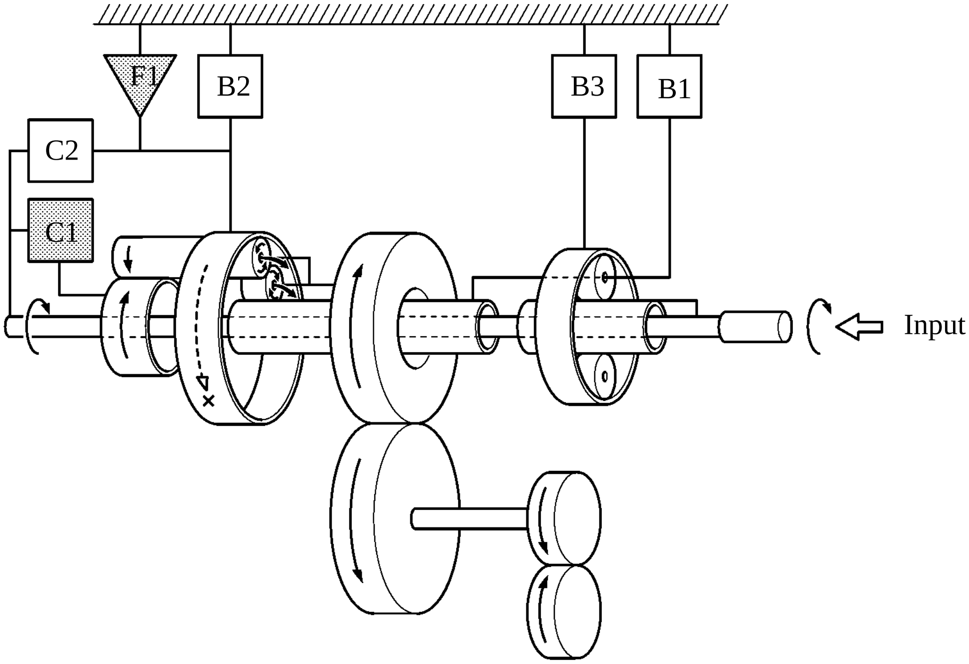
1st Gear (D Position or S Mode)



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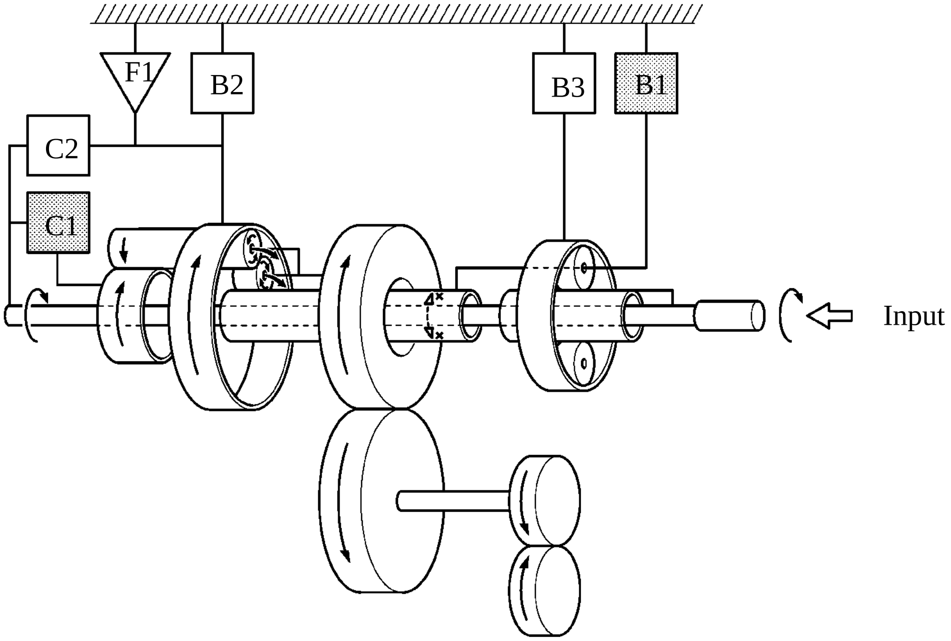
2nd Gear (D Position or S Mode)



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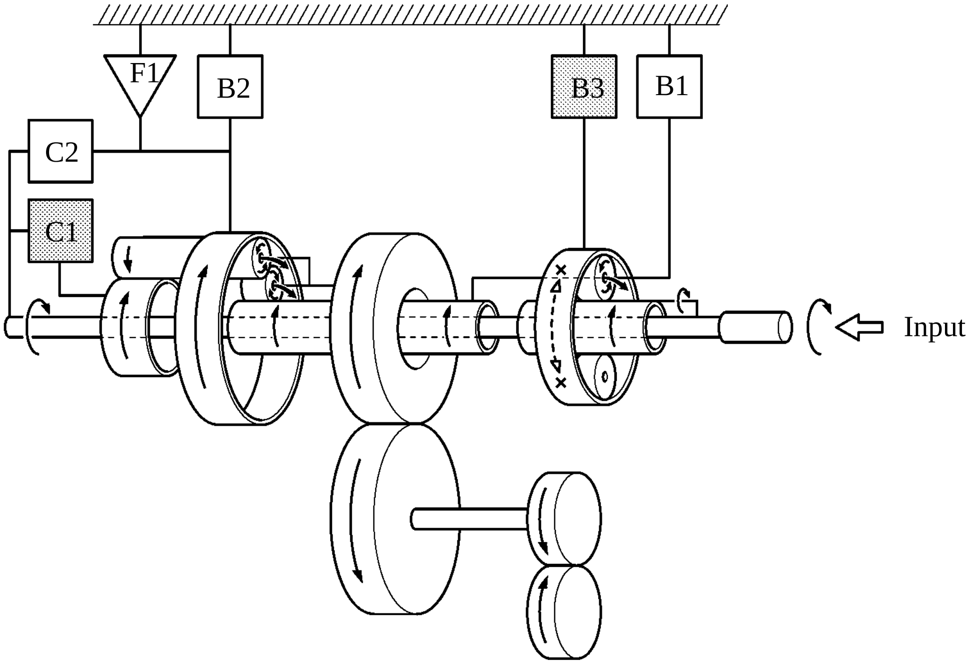
3rd Gear (D Position or S Mode)



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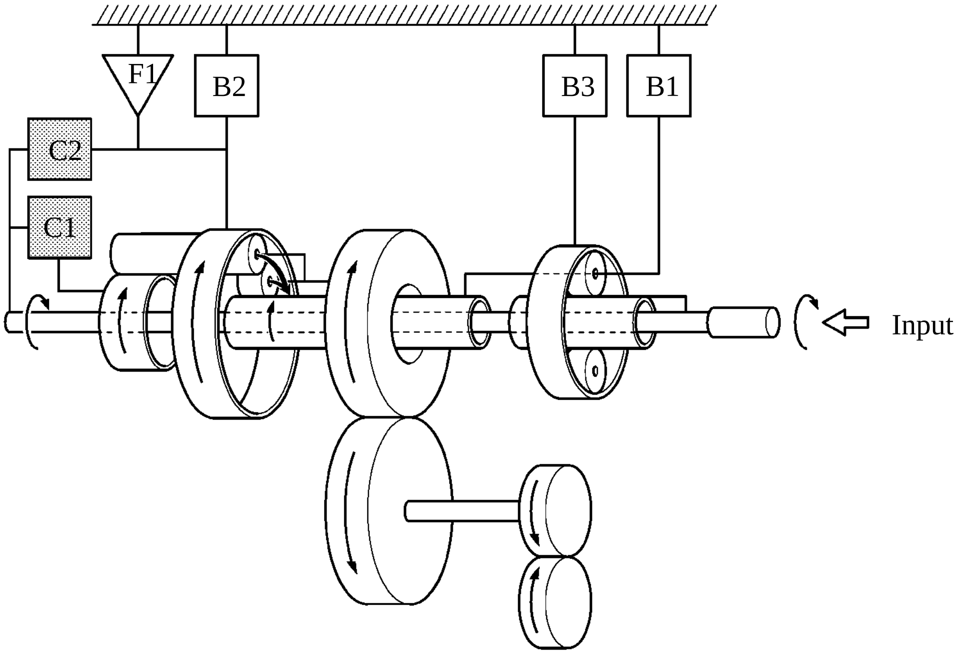
4th Gear (D Position or S Mode)



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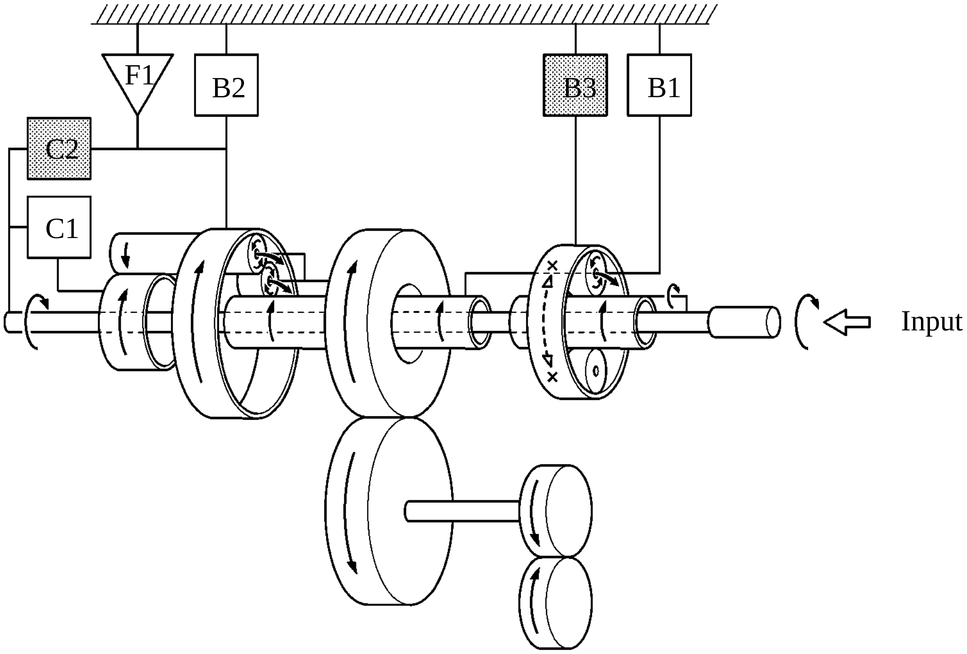
5th Gear (D Position or S Mode)



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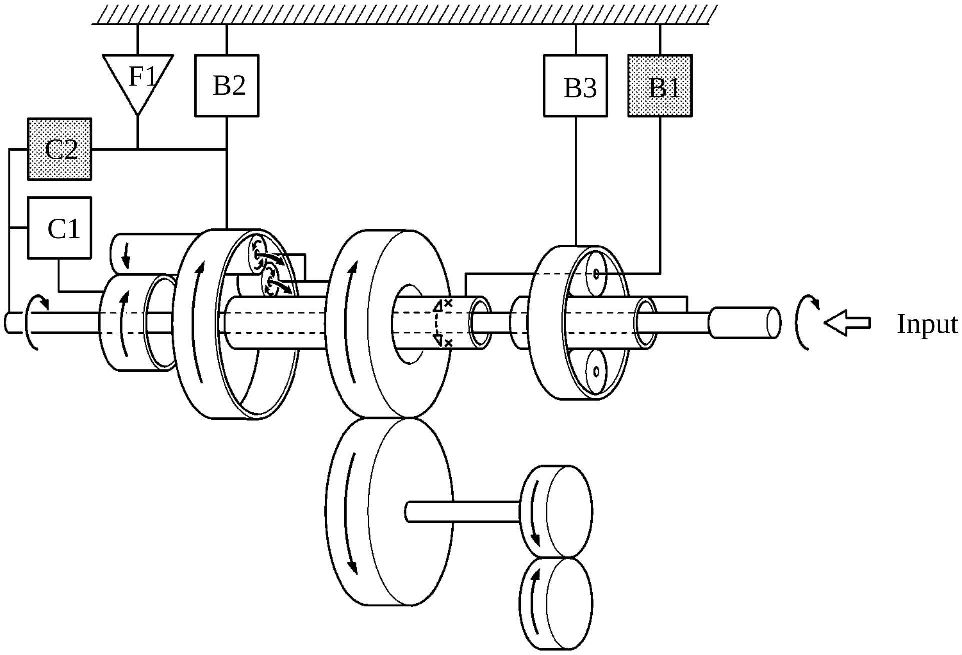
6th Gear (D Position or S Mode)



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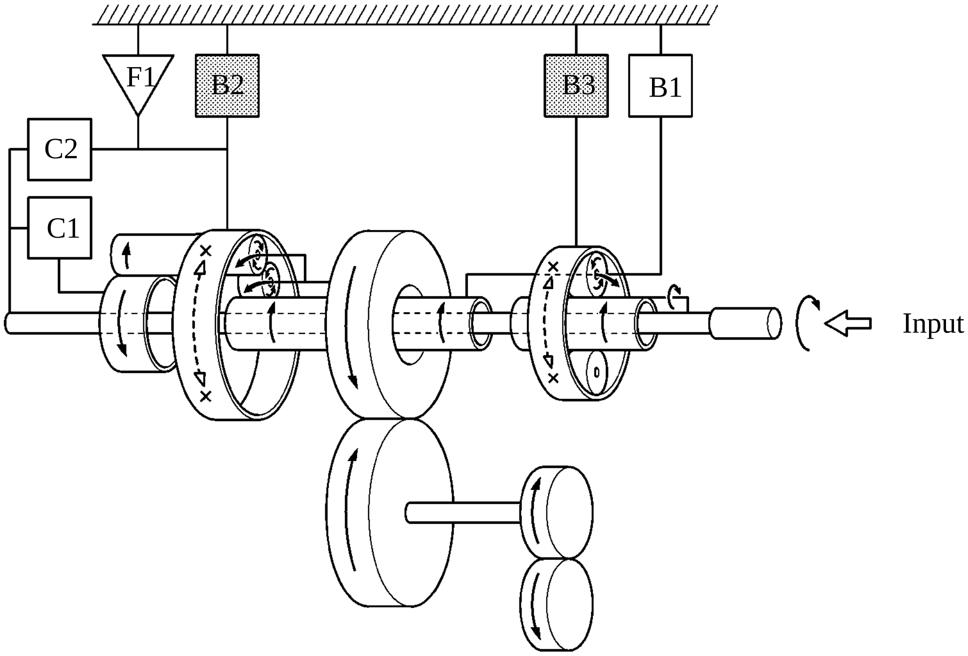
Reverse Gear (R Range Position)



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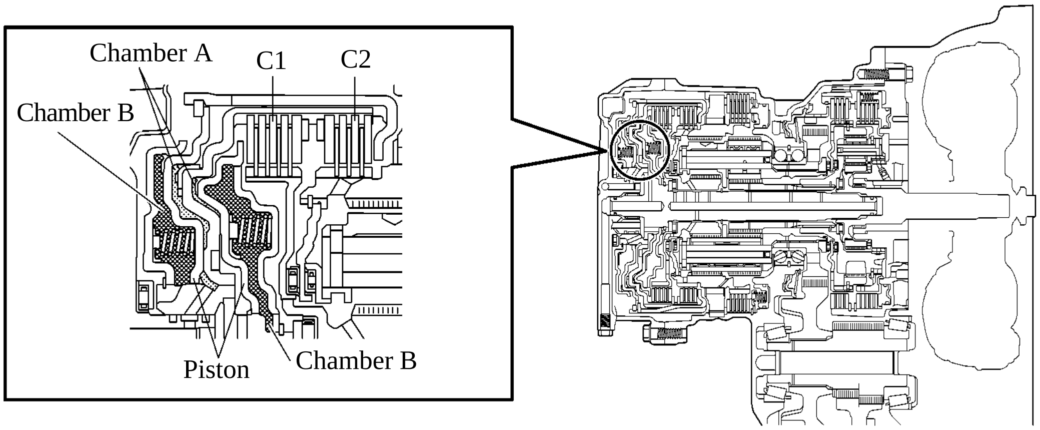
4. Centrifugal Fluid Pressure Canceling Mechanism

There are two reasons for improving the conventional clutch mechanism:

- To prevent the generation of pressure by the centrifugal force that is applied to the fluid in piston fluid pressure chamber (hereafter referred to as “chamber A”) when the clutch is released, a check ball is provided to discharge the fluid. Therefore, before the clutch could be subsequently applied, it took time for the fluid to fill the chamber A.
- During shifting, in addition to the original clutch pressure that is controlled by the valve body, the pressure that acts on the fluid in chamber A also exerts influence, which is dependent upon revolution fluctuations.

To address these two needs for improvement, a canceling fluid pressure chamber (hereafter referred to as “chamber B”) has been provided opposite chamber A.



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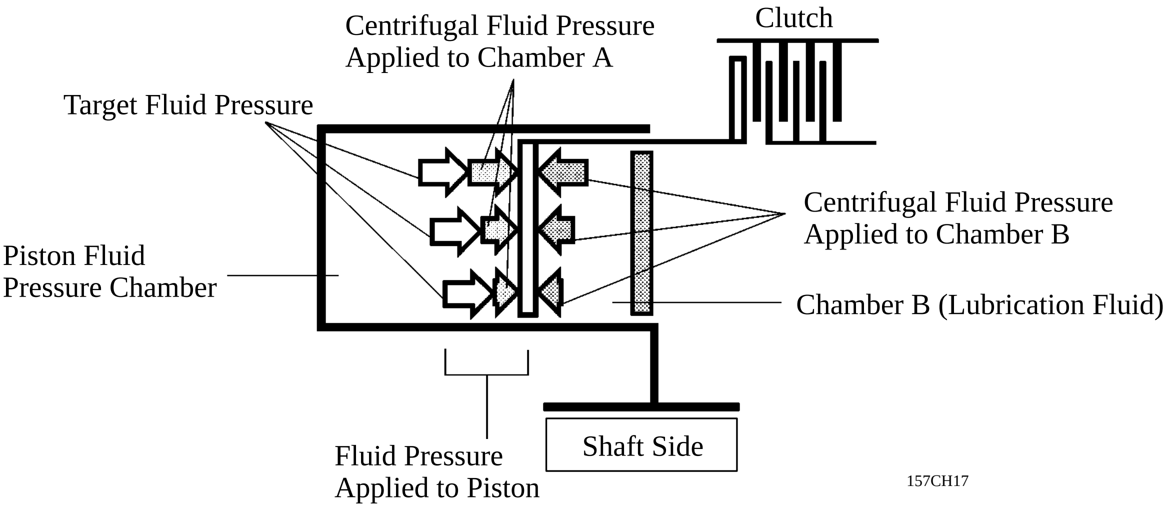
By utilizing lubrication fluid such as that of the shaft, an equal centrifugal force is applied, thus canceling the centrifugal force that is applied to the piston itself. Accordingly, it is not necessary to discharge the fluid through the use of a check ball, and a highly responsive and smooth shifting characteristic has been achieved.

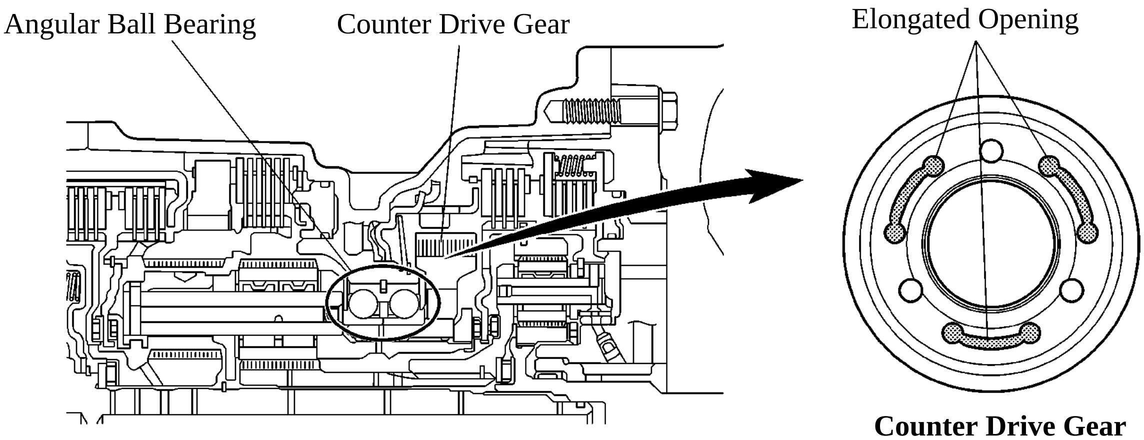

Centrifugal Fluid Pressure Applied to Chamber A
Clutch
Target Fluid Pressure
Centrifugal Fluid Pressure Applied to Chamber B
Piston Fluid Pressure Chamber
Chamber B (Lubrication Fluid)
Fluid Pressure Applied to Piston
Shaft Side

157CH17

Fluid pressure applied to piston - Centrifugal fluid pressure applied to chamber B = Target fluid pressure (original clutch pressure)

5. Counter Drive Gear

- Angular ball bearings are used to support the counter drive gear and the Ravigneaux planetary gear unit, reducing the rolling resistance and noise.
- By providing three elongated openings in the counter drive gear, the vibration conduction characteristic of the gear has been optimized. As a result, both gear noise and weight reductions have been achieved.



Counter Drive Gear

6. Clutch and Brake Pistons

- Two types of pistons are used; a non-split piston that acts in the push direction for the No.1 clutch (C1) operation, and a split piston that acts in the pull direction for the No.2 clutch (C2) operation. These two types of pistons contribute to making the entire clutch structure compact.
- When the split piston operates, clutch drag occurs due to rattling cause by the divided portion of the piston. However, by fitting springs on the piston circumference, such rattling is restrained and the occurrence of clutch drag is minimized.
- By setting the piston for the No.3 brake (B3) operation around the counter drive gear, the brake structure has been made more compact.